ENHANCED FIBER OPTIC GUIDED MISSILE (EFOGM)

Army ACTD Program

Total Number of Systems	
Fire Units:	13
Platoon Leader's Vehicles:	4
Missiles:	200
Total Program Cost (TY$):	$353M
Average Unit Cost (TY$):	$234K
Full-rate production:	N/A

Prime Contractor

Raytheon Systems

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2010

The Enhanced Fiber Optic Guided Missile (EFOGM) is designed to be a rapidly deployable missile system capable of defeating armored vehicles, rotary wing aircraft, and other high value targets. As part of the Rapid Force Projection Initiative, a "system of systems" advanced concept technology demonstration (ACTD) composed of hunters and killers, EFOGM demonstrated real-time connectivity to hunters (forward sensors) via Force XXI C31 Digitization.

The EFOGM system consists of a fire unit and eight missiles mounted on the heavy variant of the High Mobility Multi-Purpose Wheeled Vehicle. The missile has a 15 kilometer range and relies on a fiber optic data link to transmit and receive command and sensor inputs to find and defeat threat targets masked behind hills, in foliage, or in urban settings.

Once launched, the missile utilizes inertial instruments to automatically navigate along a preprogrammed flight path established by the gunner during mission planning. The missile has a high-resolution infrared seeker in its nose, designed to provide the gunner with an unobstructed view of the surrounding terrain from the missile's perspective. The gunner can pan the missile's seeker to investigate targets of opportunity as the missile flies a non-ballistic flight path around or over obstructing terrain to pre-selected target areas. The gunner identifies and designates targets and assists in refining the missile's aimpoint on vulnerable locations of the target.

EFOGM contributes to ***Joint Vision 2010*** as a tactical ***precision engagement*** system that enhances the Army's ***dominant maneuver*** capabilities in the ground battle.

BACKGROUND INFORMATION

Congressional funding for the program is being terminated due to lack of user support and program delays tied to some of the earlier technical start-up problems.

EFOGM is the result of a series of program starts and terminations dating back to 1978, to address non line-of-sight precision engagement of enemy forces. The latest version of EFOGM was selected in July 1994 to be an Advanced Technology Demonstration (ATD) immersed within the overarching Rapid Force Projection Initiative ACTD. Standard OSD oversight requirements (like a formal TEMP process) do not govern the EFOGM program. However, DOT&E and Army Test and Evaluation Command are involved in the program to provide operational test insights and to facilitate the transition should EFOGM become a major acquisition program. A variety of testing events have supported the EFOGM ATD, but no dedicated OT&E or LFT&E has been scheduled.

Initial EFOGM ATD ground testing was conducted in 1995 and 1996 at Ft. Benning, GA, including an Early Soldier Evaluation and a Battle Lab Warfighting Experiment. Missile slug tests and captive flight tests were conducted at Redstone Arsenal beginning in 1996. Some missile launch difficulties were encountered in the two initial slug (missile without seeker and warhead) launches in 1997, not atypical of immature missile programs at this early stage of development. In 1998, EFOGM participated in an Advanced Warfighter Experiment at Ft. Benning.

Subsequent flight tests in 1998 verified correction of some of the early technical problems and demonstrated further capabilities with each succeeding flight. These tests included demonstration of initial sustainer ignition, midcourse guidance via inertial navigation, and full seeker control in flights out to 13 kilometers. Tests conducted in 1999 demonstrated software commanded launcher control, target marking during flight, tracker performance during terminal dive, and terminal guidance and trajectory control to target impact.

An Extended User Evaluation was scheduled for FY00-FY01, with one company set of hardware (including platoon vehicles, fire units and missiles) to be provided to the XVIII Airborne Corps Artillery to support the 82nd Airborne Division.

TEST & EVALUATION ACTIVITY

EFOGM participated in the Rapid Force Projection Initiative ACTD Advanced Warfighter Experiment (conducted July-August 1998) at Ft. Benning by the 2nd Brigade, 101st Airborne Division (Air Assault). The objectives of the Rapid Force Projection Initiative Advanced Warfighting Experiment were to **demonstrate** the ability of a new family of airlift constrained collection and targeting systems to conduct intelligence collection, essential targeting, and target engagement against a heavily armored force. EFOGM participated as one of the engagement systems assigned to the various "hunter/killer" teams. Because of hardware delivery problems, most EFOGM capabilities were **simulated.**

The EFOGM program also continued with a series of technical flight tests originally scheduled to be completed before the Advanced Warfighting Experiment. These tests were conducted to verify missile flight characteristics and engagement capabilities. The first controlled flight (May 7, 1998) was conducted over a range of 13 kilometers to demonstrate several maneuvers involving roll, pitch, and yaw. The second controlled test vehicle flight (June 29, 1998) flew 5.3 kilometers but failed to pitch-over after exiting the tube, and as a result was manually terminated. The third flight on September 11, 1998 was the first with a full-up seeker and imaged targets throughout its 11.2 kilometer flight. The fourth flight on January 15, 1999 was the first missile with terminal guidance to successfully impact an armored target 6.3 kilometers downrange. The fifth flight on April 10, 1999 performed target marking during flight and successfully impacted an armored target at the extended range of 11 kilometers. This flight also demonstrated the warhead firing train through Captive Discharge Unit initiation. The sixth flight on June 29, 1999 experienced loss of its data link shortly after launch command. The problem was determined to be an inadequately seated fiber optic test connector. This problem has been corrected and successfully demonstrated in the contractor's facility. The successful re-firing of this flight on September 20, 1999 demonstrated warhead function and tactical mission planning. The mission was the first to demonstrate that a fully trained soldier gunner could perform all functions necessary to successfully complete an "end to end" live EFOGM missile flight mission.

An additional sequence of technical tests related to warhead penetration, electromagnetic environment, sling loading, mating of missile and fire unit, and end-to-end explosive tests were also conducted during the past fiscal year.

TEST & EVALUATION ASSESSMENT

The EFOGM concept appears to have ***potential*** as a killer of high value targets. Data from the Advanced Warfighting Experiment indicate that **simulated** EFOGM modules were the second highest tank killer on the battlefield behind the Apache helicopter. The Advanced Warfighting Experiment provided insights on issues of EFOGM's integration with C3I, and demonstrated that the EFOGM concept can potentially assist in shaping the tactical second echelon battle under certain sets of conditions. However, while the concept shows potential, data from the Advanced Warfighting Experiment are insufficient to fully assess EFOGM's capability due to limited development and delivery of actual hardware. Additional technical developments required include completion of the missile and the missile flight program, a video local area network to connect the various fire units for passage of video and data, and C3I interfaces to intelligence and artillery networks.

The missile flight program has also had mixed successes during the past calendar year. Beginning with the first controlled flight in May 1998, there have been a total of six missile flight tests

this year. Four of these tests met their objectives and two were failures. Thus the program continues to experience some of the early start up problems that delayed delivery of hardware for the Advanced Warfighting Experiment.

Technical challenges as the type experienced by EFOGM are not unusual in a new development program. However, because of the program's compressed delivery schedule, there was no room to accommodate a program slip. The user did not select the program to participate in the Extended User Evaluation, so the program has missed its window of opportunity to develop concepts and prove its worth.

CONCLUSIONS, RECOMMENDATIONS, LESSONS LEARNED

Two lessons learned from the EFOGM program relate to early involvement of testers in acquisition process and the overall ACTD concept. Early involvement by operational testers supported early test planning and design. Significant involvement by the service OTA afforded valuable opportunities to structure tests and gather data of operational significance that would enhance the transition to full program status, had the program continued.

Secondly, the basic tenets of an ATD should be strictly followed throughout ATD evolution. These include funding the program sufficiently to allow orderly progression, keeping in mind the likelihood of problems; allowing technology to evolve during the assigned period; and allowing ATD to complete its outlined program before attempting to accelerate the maturation phase. Unless additional funding is made available or significant acceleration of the technology is achieved, the ATD program schedule should be designed to accommodate these expected delays. However, if the decision is made to accelerate ATD development, the program must have a supportive user and fiscal backing to be successful in expanding original program goals.